

**Army Research Laboratory**

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ASU-ARMY OPEN NEW FLEXIBLE DISPLAY CENTER

The Flexible Display Center, designed for rapid technology development, is poised to revolutionize battlefield IT through development of small, flexible electronic information displays.

TEMPE, Ariz. – In a world where information is key, continually updated information literally can be a life saver. This is no truer than on the battlefield, where troop movements, enemy lines and weather conditions are as fluid as the battle itself.

Now, in a major effort to revolutionize on-field command and information exchange the U.S. Army and Arizona State University have established the Flexible Display Center.

A dedication for the opening of the Flexible Display Center (FDC), located at the ASU Research Park, will be at 10 a.m., Friday, Feb. 4. U.S. Army, State of Arizona and ASU officials will be on hand to mark the FDC opening.

“The FDC brings together academia, industry and government to develop what in essence will be revolutionary information portals – devices that are small, lightweight, rugged and consume very little power,” said Arizona State University President Michael Crow. “But they will be very powerful in that they will hold the key to successful military operations – real-time information.”

Crow added that the center will accelerate research, development and manufacture of flexible display technologies, which will speed commercialization of flexible displays. As an early adopter, the Army will use the technology developed in the center to accelerate the pace of Army transformation, which cannot be achieved with existing glass-based displays. In addition, the Army's investment will lead to low-volume manufacturing that meets its needs while ensuring the technologies become the industry's commercial standard.

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“Flexible displays are the next revolution in information technology that will enable lighter weight, lower power, more rugged systems for portable and vehicle applications,” said Brig. Gen. Roger Nadeau, commanding general of the Army’s Research, Development and Engineering Command.

According to Nadeau, flexible display technology will enable new applications for the soldier and Army platforms that cannot be realized with current glass-based displays. These will include body worn displays that conform to the uniform, displays that can be rolled-up and put in a pocket when not in use and unrolled for large-area, high information content, as well as many other applications that Army engineers and scientists are now considering.

The displays are essentially extremely thin computer screens, said Army Research Laboratory Director John Miller, which will be “integrated with computation, communications and global positioning subsystems to significantly enhance the soldier’s situational awareness, survivability and effectiveness.”

The Flexible Display Center is the result of a \$43.7 million, five-year cooperative agreement between the U.S. Army Research Laboratory (ARL) and Arizona State University. The February 2004 agreement has a performance period of five years with an option for an additional \$50 million over an added five-year period.

Although the Army provides core funding for the center, the center’s focus is on commercial applications. The Army is leading the effort because there is strong overlap between military needs and potential civilian markets.

For example, flexible displays are also expected to be used in a variety of consumer products, including small scale displays in personal communication devices such as cell phones and mobile e-mail, personal health and fitness monitors, medium-scale displays in automobiles and small trucks, and large-scale displays for advertising and business conferencing activities.

“We will be developing the technology for flexible displays, improving it to the point of commercialization, so military developers will be able to buy them off the shelf and integrate them into their systems,” said FDC Director Greg Raupp.

ASU was awarded the center after an intense, nearly yearlong national competition. As a result of the contract, ASU purchased a state-of-the-art multi-functional display manufacturing R&D facility in the ASU Research Park.

The signature 250,000 square foot facility was originally designed for flat panel display R&D to manufacturing. It includes 43,500 square feet of advanced clean room space and extensive wet and dry labs. ASU acquired the facility to enable a very rapid start up for the project, a scenario the Army deemed important to the project’s success.

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The center has already established a fully operation 6-inch wafer-scale thin film transistor (TFT) pilot line, a leading edge organic light-emitting diode (OLED) R&D laboratory, TFT and display design and testing capability, and a full suite of characterization tools. A GEN II pilot line processing 370 mm x 470 mm (14.5 inch x 18.5 inch) substrates will become operational in 2006. Additional capabilities in design, process tool development and display assembly will be provided by FDC member companies leasing space in the facility.

By mid 2005, Raupp said, the center will have produced its first limited flexibility 4-in. diagonal concept devices. The overall goal is to continue improvements to display functionality (with increases in size, reliability and flexibility) with final display sizes possibly being as large as 15- to 17-inch diagonal.

Initially, the displays will be monochrome but will be developed into full color displays. In terms of degree of flexibility, the initial rugged displays will evolve into conformal displays, then rollable, and finally into foldable devices. In parallel, the center will develop the associated manufacturing processes required to efficiently and cost-effectively produce integrated flexible display demonstrators.

“There are multiple technical challenges to making these devices fully flexible, light weight and extremely low power,” Raupp said. “But we have the right university, industry and government team in place, and we are confident that we can meet those challenges.”

Working within the center will be researchers from a strategically formed team of military, industry and academic partners. Army partners include the ARL and the Natick Soldier Center. Industry partners include EV Group, Honeywell, Universal Display Corporation, Kent Displays, E Ink, Ito America, General Dynamics, Rockwell Collins, Abbie Gregg Inc., and the U.S. Display Consortium. University collaborators include Cornell University, the University of Texas and Waterloo University. Additional partners will be engaged in the near future as the center matures.

“The outstanding capabilities of our facility and its manufacturing R&D infrastructure will enable us to work side-by-side with our partners to intensively develop new breakthrough technologies,” noted Raupp.

As part of the flexible display initiative, a suite of candidate display technologies will be developed and fully evaluated. Select technologies will be integrated into working prototypes and demonstrators for controlled field testing by the Army and partner companies. Learning gained through the prototyping activities will feed back into the research program to drive further advances in display size, capability and performance.

Flexible display technology promises to boost U.S. display companies by helping to create many significant future commercial applications.

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“The FDC is more than a single purpose center,” said Jonathan Fink, ASU Vice President for Research and Economic Affairs. “This center will not only aid the Army in a very important quest to significantly update its IT capabilities, but it will spawn a new industry largely based in Arizona that will specialize in flexible intelligent displays to be used in commercial devices in a host of new products that will increase productivity and enhance leisure time activities. ”

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RDECOM is responsible for 75 percent of the Army’s science and technology objectives, overseeing advances in weapons, communications, clothing, food and vehicles. As part of RDECOM, ARL, headquartered in suburban Washington, D.C., is the Army’s laboratory for fundamental and applied research. It provides key technologies, analytical support and critical links between the scientific and military communities to help American soldiers in the battlefield.